THE RELATIONSHIP OF ROLE IDENTIFICATION AND SELF-ESTEEM TO SEX DIFFERENCES IN THE EMBEDDED FIGURES TEST

By

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with gratitude

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Abstract of Dissertation Presented to the Graduate Council of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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The study included an extensive review of the literature concerning the development of Herman Witkin's constructs of field-dependence-independence, analytical versus global cognitive style, and the differentiation hypothesis. Special attention was devoted to the issues surrounding the traditional sex differences found in perceptual style and Edward Zigler's concern that tests measuring perceptual style merely tap intelligence factors. The role of self-esteem in perceptual style was also singled out since the inference is often made that field-independent persons have high self-esteem and field-dependent persons have low self-esteem. This inference has not been adequately tested.

The purpose of the study was to examine the relationship between sex role identification, self-esteem, and perceptual style while controlling for differences in intellectual ability. The control for I.Q. was essential in order to

delineate whether any obtained personality differences were merely concomitants of varying intellectual capacities or whether they were significant dimensions in themselves separate from I.Q. More specifically, the present study sought to investigate the relationship of role identification and self-esteem to see differences in Embedded Figures Test performance using I.Q. as a covariate. The following hypotheses were tested: (1) those subjects whose role identification is relatively masculine will be more field independent than those subjects whose role identification is more feminine, regardless of biological sex, (2) those subjects with high self-esteem will be more field independent than those subjects with low self-esteem, (3) self-esteem will act to reinforce the subject's preferred mode of responding, which will be congruent with his or her role identity.

Four tests were administered to fifty male and fifty female student volunteers: The Group Embedded Figures Test (GEFT), which is a measure of field-dependence-independence; the Personal Values Abstract (PVA), which includes a scale appraising degree of femininity; the Tennessee Self Concept Scale (TSCS) from which a score reflecting overall level of self-esteem is computed; and the Culture Fair Intelligence Test, Scale 3, Form A.

Standard multiple regression and analysis of covariance procedures were followed. The results indicate that

(1) males are significantly more field independent than females, (2) those subjects whose role identification is relatively masculine are more field independent than those subjects whose role identification is more feminine, regardless of biological sex, (3) neither self-esteem nor self-esteem interacting with role identification significantly influences perceptual style, and (4) I.Q. has a significant positive relationship to the GEFT.

The results were discussed in terms of the Witkin-Zigler controversy concerning the influence of intelligence in personality concomitants of perceptual style. Also discussed was the role of socialization versus constitutional factors in perceptual sex differences.

INTRODUCTION

History of Analytical Versus Global Cognitive Style

A review of the development of Herman Witkin's construct of analytical versus global cognitive style is presented here for several reasons. First, the construct refers to cognition. The study of cognitive functioning has become increasingly important in the field of psychology in general, and in the psychology of personality in particular. Cognition refers to the processes through which the individual obtains information from the environment, transforms that information in his own way, and then uses it to respond to the environment. Sensation, perception, memory, thinking, and problem solving are all parts of the ongoing cognitive processes of the individual (Neisser, 1967). Second, the history of the development of the construct of global versus analytical cognitive style is of interest because both the name and the conceptualization of the construct changed over time and through research. Witkin started with a construct called field dependence-field independence and later extended the meaning and significance of the construct to its current form. Third, the research concerns individual differences, but it started with a focus

on perceptual factors which were presumed to be shared by all individuals. Cronbach (1957), in a classic paper entitled "The Two Disciplines of Scientific Psychology," characterized two distinct approaches to research--the experimental and the correlational. The experimental approach is to hold everything constant except for the few variables of interest, the goal being the isolation of the factors that influence a typical human being. In its extreme form, it is described by Cronbach as follows:

> Individual differences have been an annoyance rather than a challenge to the experimenter. His goal is to control behavior, and variation within treatments is proof that he has not succeeded. Individual variation is cast into that outer darkness known as "error variance." For reasons both statistical and philosophical, error variance is to be reduced by any possible device. You turn to animals of a cheap and short-lived species, so that you can use subjects with controlled heredity and controlled experience. You select human subjects from a narrow subculture. You decorticate your subject by cutting neurons or by giving him an environment so meaningless that his unique responses disappear. You increase the number of cases to obtain stable averages, or you reduce N to 1, as Skinner does. But whatever your device, your goal in the experimental tradition is to get those embarrassing differential variables out of sight. (p. 674)

In contrast to the experimental approach, where treatments are varied and individual differences are minimized, the correlational approach takes existing individual differences to be the crux of the matter and regards treatment or situational factors as a source of annoyance. Thus the distinction is between the experimental approach, where interest lies in uniformities produced as a result of

situational variation and the correlational approach, where interest lies in individual differences that are stable across situations. In a sense, Witkin's research started with what Cronbach described as an "experimental" orientation and turned into a "correlational" effort. Cronbach emphasized the need for research that uses both methods in combination. Such research would look at how different types of individuals are affected by situational factors. The focus would not be on situations alone nor on individual differences alone, but on the interactions between situations and individual differences. In very recent years, experimentally oriented research on Witkin's global versus analytical construct is being designed with takes individual differences into full account; Cronbach's call to methodological rapproachment is becoming a reality.

The history of Witkin's development of the construct of analytical versus global cognitive style begins with an interest in perception. The problem was how individuals maintain a proper orientation toward the upright in space. Earlier work had stemmed from two positions. One position (Wertheimer, 1912) emphasized qualities of the visual field and suggested that individuals use cues from the orientation of objects in space to determine the upright. The other position (Gibson & Mowrer, 1938) emphasized operations of the sense organs and suggested that individuals use cues from the direction of the force of gravity on their body to

judge the upright. Typically the cues from the visual and gravitational sources coincide in direction and lead to an integrated perception. But what happens if the individual is left with only one source of cues or if cues from the two sources are in conflict with one another?

Work thus began in 1942 on separating out the effects of two variables on perception of the upright for all individuals: (a) the structure of the field and (b) the direction of gravitational force acting on the body. A series of experimental studies emerged in the literature (Asch & Witkin, 1948a; Witkin & Asch, 1948a; Witkin & Wapner, 1950; Wapner & Witkin, 1950), each study logically following and building on its predecessor in a step-by-step fashion. Gradually, the necessary manipulations were identified which permitted the separation of the gravitational standard of the upright from the standard provided by the visual field. The aim was to evaluate the relative importance of each. Witkin designed ingenious (and often very elaborate) testing devices for this purpose. For example, in order to alter the direction of the force that acts on the body (thereby altering the gravitational standard for judgment), he built a "centrifugal room"--a fully enclosed box which could be rotated around a circular track at varying speeds (Witkin, 1950a; Witkin, 1952; Witkin, 1964b). This was called the Rotating Room Test.

Another device used in this early research was the Rod-and-Frame Test (RFT), which evaluated the individual's perception of a single object in a very limited visual field (Witkin & Asch, 1948b). In the RFT the subject sits in a completely darkened room observing a luminous frame which surrounds a movable luminous rod. The experimenter tilts the frame to a variety of angles, and the subject's task is to bring the movable rod to a position that he perceives to be upright. To make the rod vertical, the subject must disregard the tilt of the field (frame) and make use of cues from his body position. A large tilt of the rod when the subject reports it to be vertical suggests adherence to visual cues, whereas a small tilt indicates independence of the visual field and reliance on body cues.

A second test used was the Tilting Room-Tilting Chair Test (TRTC Test). In this test, the subject sits in a movable chair in a small room. Both the room and the chair can be tilted, in the same direction or in opposite directions. On some trials the subject is asked to return the tilted chair to the perceived upright position while on other trials the task required of him is to return the room to the perceived upright. In the former case, adjustment of the position of the body in accordance with the tilt of the room would suggest reliance on visual field cues, whereas bringing the body to the true upright position would show independence of the field and awareness of

pressure sensations (Asch & Witkin, 1948b; Witkin, 1949b; Witkin, 1949c).

The research on how visual field cues and bodily sensation cues affect the perception of the upright led to significant group findings, but it also became clear that there was great variation among individuals. Average values hid individual variation, and group statements about the nature of perception did not hold true for many individuals. It became impossible to decide whether visual or postural cues were more important because a simple generalization was impossible--"more important for whom?" became the relevant question. Research began to focus on the study of individual differences in perception and the relation of perception to the overall psychological organization of the individual.

> This transition in our work toward a concern with individual performances was one that is not unusual in psychological studies; and it was assuredly a desirable one, first from the standpoint of the psychologist's fundamental interest in the individual and secondly from the standpoint of the great uniqueness of the individual, psychologically considered, as compared with the basic unit of study found in other sciences. . . . The fact that a field of stated structure leads to a range of possible results rather than a single result reflects the role of personal factors, unique to the individual, in determining the outcome. Thus, the full task of the psychologist consists not only of establishing the average results and the range of results arising from a field of given structure but also of determining the factors within individuals responsible for their location at given points in this range. Only if both steps are taken will it be possible to arrive at fully comprehensive laws of perception. (Witkin, 1949a, pp. 167-168)

Witkin was not the only psychologist during the late 1940s who had reached the conclusion that perception was intimately related to personality factors. Pioneer studies at Columbia University and the City College of New York by Dr. Gardner Murphy and his students held up in vivid relief the fact, in his own words, that "each person sees the world about him through his own colored glasses, in terms of his own idiom, his own hopes, and his own fears" (Klein, 1953, pp. 93-94). In 1947 work began at the Menninger Foundation in Topeka, Kansas, on what was called the "Perception Project." The research, directed by Dr. David Rapaport and later by Dr. George Klein, was a full-scale attack on the problem of self-consistency in a person's thought processes, with perception used as the window through which these processes were observed (Klein, 1953; Klein, Holzman, & Laskin, 1954). Meanwhile at Harvard University, Dr. Jerome Bruner and his colleagues were busy formulating what was to be later tagged the "New Look" in perception, an approach which emphasized socially derived factors as being major determinants of perception (Bruner & Goodman, 1947; Bruner, 1957).

In 1949 a major symposium on personal and social factors in perception was held in Denver which brought these and other independent investigators together to share their ideas and findings. The papers presented at the symposium were published in a book, Perception and Personality:

A Symposium (Bruner & Krech, 1950). Witkin was an active participant in the symposium and was undoubtedly influenced and inspired by the contact with kindred spirits.

With the change of focus from group norms to individual performance and the change of method from an experimental approach to a correlational one, Witkin launched a major study, culminating in the 1954 publication of Personality Through Perception (Witkin, Lewis, Hertzman, Machover, Meissner, & Wapner). Some isolated articles based on this project were published prior to the book (Witkin, 1949d; Witkin, 1950b; Witkin, Wapner, & Leventhal, 1952) as well as a debate between Witkin and two of his critics on the role of instruction in space-perception experiments (Mann & Boring, 1953; Witkin, 1953). Nevertheless, it took the 1954 publication of the book to satisfactorily acquaint readers with the extent of Witkin's project.

The overall plan of the study was to investigate three areas (a) self-consistency in perception, (b) the relationship between personality and perception, and (c) developmental changes in perception. The results of research in these areas supported the construct of a personality characteristic called field dependence-field independence. Basic to this trait was the ability of the individual to keep an item (one's own body, an external object, a geometrical figure) separate from a field or

embedding context. Field-dependent (FD) people, or those relatively more field-dependent, could not obtain such separation from a field, while more field-independent (FI) subjects were able to do so.

Witkin used another measuring device called the Embedded Figures Test (EFT) in the course of the project. The EFT is a paper-and-pencil test that requires the subject to find a simple figure or shape within a larger complex figure. The test does not involve the use of body posture or body position, but it does measure the ability of the individual to separate an object from the context in which it occurs. In this sense, it is similar to the ability to separate the body from the field (TRTC Test) or the rod from the tilt of the frame (RFT). The finding of a clear and consistent relation between the use of postural cues in the space orientation tests and the ability to find a geometrical figure hidden in a complex figure (EFT) led to the construct "field dependence-field independence" and to its definition in terms of an ability to deal with a given field analytically or to perceive a part of a field independently of its surroundings.

To be more specific concerning the overall design of Personality Through Perception, measures of ability to perceive the true vertical based on the RFT, the TRTC Test, and the Rotating Room Test (the three "orientation" tests) were obtained from fifty-two male and fifty-one

female college students (the normal, adult group). Related perceptual and "body-action" tests consisted of the EFT; a test of brightness-constancy; a test involving auditory-visual conflict; a body-steadiness test; a body-balance test; and a two-hand coordination test. Personality measures were obtained from an autobiography, the MMPI, a sentence-completion test, a two-hour interview, the Figure Drawing Test, the Rorschach, the TAT, and a word-association test.

Besides the college students, two other groups were studied: thirty-eight male and thirty-nine female hospitalized psychiatric patients, and 270 children in five age groups ranging from 8 to 17 years. Each psychiatric patient was given two of the orientation tests, the EFT, and the same personality tests used for the college students. The three perceptual tests were also used in the developmental study employing children, thus making it possible to compare three different populations with respect to degree of dependence upon the visual field. Personality measures for the children were obtained from the Rorschach, the TAT, the Figure Drawing Test, and a miniature-toy play situation.

The generality of field-dependence among different orientation tests and the other perceptual-motor tasks was determined by analysis of intercorrelations. Appreciable correlations were found between measures of field-dependence

in vertical orientation and each of the other tests, with the exception of the task involving auditory-visual conflict, thus substantiating the hypothesis that field-dependence is a fairly general trait. The relative lack of success in efforts to modify perceptual orientations suggested a deep-seated nature of the characteristic. Furthermore, retesting of subjects after five-week, one-year, and three-year intervals suggested considerable longitudinal stability in mode of perceptual orientation. Thus, self-consistency in perception was supported.

Witkin's major objective was to demonstrate relationships between perceptual functioning and a number of personality characteristics. Correlational techniques were used as the main procedure for comparing perception and personality.

In general, FD and FI subjects were found to differ strikingly in their ways of relating to their environment and to themselves. More FD subjects were characterized by a passive acceptance of the environment, whereas more FI subjects expressed an active coping in dealing with the environment. The former showed either inhibition of impulses or uncontrolled expression of hostility. In contrast to them, FI subjects showed an ability to express their impulses in a relatively controlled manner; they showed an ability to act, to assert themselves, and to control disruptive forces in the pursuit of a goal.

In terms of their relations to themselves, FD subjects were found to be tense, to lack insight into themselves, to yield to feelings of inferiority, and to have a low evaluation of their body. In contrast with this picture was the one presented by the FI subjects. These individuals demonstrated considerable self-awareness, compensated for feelings of inferiority, and were more self-accepting of their bodies.

To quote Witkin et al.:

> In summary, then, field-dependent persons tend to be characterized by passivity in dealing with the environment; by unfamiliarity with and fear of their own impulses, together with poor control over them; by lack of self-esteem; and by the possession of a relatively primitive, undifferentiated body image. Independent or analytical perceptual performers, in contrast, tend to be characterized by activity and independence in relation to the environment; by closer communication with, and better control of, their own impulses; and by relatively high self-esteem and a more differentiated, mature body image. These are the relationships that were revealed in our intensive study of a group of young, normal adults, and confirmed in studies of children of hospitalized psychiatric patients. (1954, p. 469)

While the roots of these differences in perception and personality were not discovered at this point in the research, there was clear evidence in support of the field-dependence construct--differences held over a variety of situations, they held over time, and differences in perceptual orientation were found to be associated with broad differences in personality organization. Furthermore, significant sex differences in perceptual orientation were

found which again suggested a process basic to the psychological organization of the person. At all ages, women were found to be more FD than men, to show more passive acceptance of the field than men, and to be less responsive to bodily experiences.

Results from the patient sample showed that hospitalized psychiatric cases tended to be more extreme in their perceptual performance than normal adults. The patients' scores on the orientation tests fell into a bimodal distribution with a marked preponderance of extremely field-dependent and extremely field-independent performances and a small proportion of cases in the intermediate group. The sex differential noted in the normal sample was strongly evident in this group, and the personality-perception relationships established for the normal group were effectively maintained here also.

In addition, a clear developmental trend emerged from the work with children. It was found that children tend to be field dependent early in their perceptual development and to become field independent as they grow up. The change from a FD to a more FI orientation was particularly marked in the 8-to-13 year period. After this age there was a tendency to level off, and subsequently (starting at 17 years for men and 15 years for women) there was a slight tendency to regress (Witkin, 1959).

In the years following the 1954 publication of Personality Through Perception, several major book reviews and critiques appeared in the literature (Holtzman, 1955; Postman, 1955; Gruen, 1957). Some reviewers were more accepting of Witkin's claims than others. Nevertheless all of them suggested that the high correlations found between the perceptual and personality variables should be regarded with caution. They pointed out that the personality measures used by Witkin were themselves questionable in terms of reliability and validity. Also these tests, which were developed primarily as clinical diagnostic instruments, cast the investigation of personality correlates of perception into a psychopathological mode. It was felt that Witkin made numerous unwarranted psychoanalytically oriented inferences which were too intuitive and too highly speculative.

The most damning indictment against the Witkin et al. study, however, centered not around the problems of reliability and validity but around the methodology used for establishing the perception-personality relationships in the basic sample of normal adults. The personality protocols of those who gave extreme perceptual performances on two of the space-orientation tests were searched for differentiating scores. Only those scores which were found to discriminate between subjects extremely high and extremely

low in dependence on the visual field were retained for further analysis. It was these scores alone which were used in the computation of the correlation coefficients. These correlations were not validated on independent samples of normal adults.

Witkin was aware of this methodological weakness and offered the following validations of his personality measures. (a) The personality measures were selected on the basis of their differentiating value for two of the perceptual tests but they correlated significantly with two other perceptual tests as well. (b) The measures developed on the normal sample were later applied to hospital patients and to some extent to children of different ages, and these later applications also yielded significant relationships.

In 1959, Young attempted a re-examination of Witkin's personality-perception hypotheses, an endeavor which essentially represented a replication of the Witkin et al. study. Although Young attempted to evaluate the same variables as Witkin, he used different instruments in some cases. Perceptual tests given were the Rod-and-Frame, the Embedded Figures, and the Chair-Window. Personality tests given were the Self-Activity Inventory, the Draw-a-Person, and the Holtzman Inkblot. Witkin's hypotheses found considerable support, a result which was considered all the more significant in view of the fact that a different battery of tests had been administered.

While the ideas in Personality Through Perception were supported by some and criticized by others, the major influence of the book was to stimulate research done by investigators working independently of the Witkin group. Most articles appearing in the literature between 1955 and 1962 and spurred by Witkin's work continued the pattern of correlating personality indices with perceptual indices of field dependence in an attempt to further clarify and define personality-perception parameters. As examples, two frequently chosen topics were the relationship between need for achievement and FI (Marlowe, 1958; Wertheim & Mednick, 1958; Honigfeld & Spigel, 1960) and the relationship between conformity and FI (Linton, 1955; Block, 1957; Jackson, 1958). Independent researchers also began to assess the role of special abilities, such as intellectual and spatial abilities, in FI performance (Jackson, 1957; Rosenfeld, 1958; Meux, 1960).

A major review of the studies precipitated by the Witkin et al. book was published by Elliott in 1961. Elliott's integrative analysis of the existing data suggested to him that field independence could more profitably be viewed as a direct index of "internalization and autonomy of complex cognitive processes" rather than as an index of personality traits and motives. In the same year Witkin (1961) published an article which reached a similar

conclusion. Based on his own further research into the characteristics associated with perceptual modes of functioning, Witkin announced the development of the construct "global versus analytical style of cognitive functioning" and the development of the "differentiation hypothesis."

Style of cognitive functioning refers to the processes of information exchange between the individual and his environment. According to Witkin, a person with a global style of cognitive functioning tends to submit to the dominant organization of a field and to experience items as "fused" with their backgrounds. For these individuals the environment is experienced as a vague, amorphous field in which the qualities of the whole dictate the manner in which the parts are experienced. In contrast to this is the analytical style of cognitive functioning in which the individual experiences items as discrete from their backgrounds and is able to overcome the influence of an embedding context. For the analytical person, the perceptual field contains parts that are well delineated and that contain a quality of structure or relationship--there are discrete parts and the field as a whole is organized.

The differentiation hypothesis refers to the complexity of a system's structure. A more complex system, or one that is more differentiated, has more heterogeneity and more specialization of function than does a less

complex system. The differentiation hypothesis suggests a relationship among levels of differentiation in a variety of areas in personality functioning.

> Among the major characteristics of the functioning of a highly differentiated system is specialization. The subsystems which are present within the general system are capable of mediating specific functions which, in a relatively undifferentiated state, are not possible or are performed in a more rudimentary way by the system as a whole.
>
> When used to describe an individual's psychological system specialization means a degree of separation of psychological areas, as feeling from perceiving, thinking from acting. It means as well specificity in manner of functioning within an area. Specific reactions are apt to occur in response to specific stimuli as opposed to diffuse reaction to any of a variety of stimuli. Parts of a perceptual field are experienced as discreet rather than fused with their background. Impulses are channelized, contrasting with the easy "spilling over" characteristic of the relatively undifferentiated state. (Witkin et al., 1962, pp. 9-10)

According to the differentiation hypothesis, development in the articulation of the self and in the articulation of the world follow hand in hand with one another--inner differentiation is associated with greater articulation of experience of the outside world. Thus field dependence-field independence is the perceptual component of psychological differentiation and global-analytical is the cognitive component.

In their book on Psychological Differentiation (Witkin, Dyk, Faterson, Goodenough, & Karp, 1962), Witkin and his colleagues presented considerable evidence in support of

this relationship between inner and outer experience, between perceptual and cognitive modes of functioning. Furthermore, the development of differences in these processes was found to be associated with distinct styles of mothering. The subjects for this study were groups of children, primarily in the 8-to-17 year age range. In those groups where the primary focus was on mother-child relationships, the mothers were also subjects. The authors examined six areas: (1) perceptual style; (2) cognitive, intellectual functioning; (3) ability to structure experience; (4) self-differentiation; (5) controls, defenses, psychopathology; and (6) origins of global and analytic cognitive styles. Many indices of these different areas were used. They included Witkin's standard perceptual orientation tests and the EFT to measure perceptual style; the Stanford-Binet and the WISC as well as such tests as Dunker's insight problems and Einstellung procedures to measure intellectual functioning; the Rorschach, TAT, an interview, and memory tests to measure structuring and articulation of experience; Figure Drawings, the Finger Apposition Test, and conformity and suggestibility procedures to measure self-differentiation; the Rorschach, TAT, Figure Drawings, an interview, and an analysis of dream recall to measure controls, defenses, psychopathology; in-depth interviews with mothers, observations of mother-child interaction, mothers' Figure Drawings and EFT to

measure origins of global and analytic cognitive styles in children.

The ability to overcome an embedding context was noted in the perceptual realm. A similar ability was evidenced in the realm of intellectual functioning. While Witkin reported no difference between analytical and global children in general intelligence, he did report a difference on those intellectual tasks that required subjects to overcome a context and to take an analytical approach toward information.

In responding to external stimuli, analytical children were more able to define units in the stimuli and to impose structure on their experience than were global children. This difference in response to external stimuli was paralleled by a difference in response to the self and to the organization of the self-concept. Analytical children experienced the body and self as structured and distinct from the environment, whereas global children experienced the body as a vague "mass" and the self as fused with its surroundings.

With the differences already noted, it is not surprising that global and analytical children were found to differ in their modes of dealing with impulses and anxiety, and in the symptoms they developed in psychopathology. Whereas analytical subjects "split off" thought and perception from feelings, global children fused these areas with

one another and thought and feeling were either expressed together overtly or they were totally submerged into the unconscious. Pathology occurred in both analytical and global children who differed in the kinds of problems and symptoms they suffered. Global children tended to develop identity problems and to develop symptoms associated with dependency problems (obesity, asthma); analytical children tended to become overly controlled, overideational, and overly isolated (obsessive-compulsive).

Striking differences were found in the mothers of global and analytical children. Mothers of analytical children tended to have greater self-assurance and self-realization than mothers of global children. The mothers of analytical children accepted and encouraged an appropriate sexual role for their children and supported a separation from them which is essential for the development of a separate identity. These mothers had developed personal values and standards of their own, so that they felt free to encourage the child to develop an independent, articulated sense of himself and the world. There did not appear to be much difference between the mothers in terms of how much they encouraged children to do things on their own, but mothers of analytical children appeared to encourage such acceleration to meet the child's needs whereas the mothers of global children appeared to encourage acceleration to gratify their own needs. In light of the above,

it is not surprising that there was some evidence that the mothers of the analytical children were themselves more differentiated than were the mothers of the global children.

The 1962 book by Witkin et al. created an avalanche of interest. Independent researchers both in this country and in Europe joined the bandwagon. Witkin's constructs became extremely popular with graduate students as evidenced by the sheer number of dissertations devoted to the subject. The critics were still around; but, for the most part, their criticisms were identical to those voiced after the 1954 publication of Personality Through Perception, and they had lost their punch. There was one exception, however. In 1963, Edmund Zigler wrote a book review of Psychological Differentiation which was published in Contemporary Psychology. It was Zigler's thesis that Witkin's perceptual measures are simply nonverbal measures of intelligence. Zigler's article caused a flurry of debate (Zigler, 1963a,b; Witkin et al., 1963, Proshansky, 1963, Korchin, 1963) with Witkin staunchly defending his position that (1) indices of differentiation are not measures of intelligence, (2) some nonverbal measures of intelligence are, in part, measures of differentiation, and (3) the concept of differentiation is rather more developed theoretically than the concept of intelligence as it is used in standardized tests of intelligence; therefore, to conceive of

measures of differentiation as measures of intelligence is to replace a relatively sophisticated theoretical concept with a primitive theoretical concept. Much of the data on the relationship between field-dependence and intellectual functioning upon which Witkin based his argument had initially been published by two of his colleagues, Goodenough and Karp, in 1961.

In spite of Witkin's claims to the contrary, the idea that differences in intelligence mediate the relationship between perception and other variables had a sobering effect on many people. To date, Zigler's thesis has been the most serious threat and the only truly heuristic criticism of Witkin's work; and it has generated considerable attention (Elkind et al., 1963; Witkin et al., 1966; Minard & Mooney, 1969; Powell, 1970; Dubois & Cohen, 1970; Hustmyer, 1970; Busch & DeRidder, 1971; Wachtel, 1972; Gough & Olton, 1972; Vernon, 1972). While there is no definitive answer to the question of the role which intelligence plays, it is the general feeling today that intelligence is, at least partially, involved in field-dependent-independent performance; and, to be on the safe side, studies should be designed which statistically control for differences in intelligence. Only in that way can science attempt to ferret out the effects of the intelligence component from other variables.

It would be erroneous for the reader to assume that the bulk of research since 1962 has dealt with the intelligence factor. It has not. The scope of research mushroomed into every conceivable cranny of interest. Some researchers continued to correlate measures of perceptual style with personality variables. As a selected sample of topics, field-independence was studied in relation to creativity (Spotts & Mackler, 1967; McWhinnie, 1969; Bloomberg, 1971; Ohnmacht & McMorris, 1971), dogmatism (Hellkamp & Marr, 1965; Ohnmacht, 1966; Grippin & Ohnmacht, 1972), anxiety (Shipman et al., 1970; Stuart & Bronzaft, 1970; Dargel & Kirk, 1971), authoritarianism (Stuart, 1965; Clark, 1968), and locus of control (Willoughby, 1967; Lefcourt & Telegdi, 1971).

Other people turned to the subject of the stability of perceptual style. By the time Witkin published Psychological Differentiation in 1962, he was firmly convinced that the cognitive style of each individual is a stable and unchangeable characteristic. Two series of experiments led him to this conclusion. First, longitudinal studies which followed several groups of subjects for three years, one group for five years, and another group for seven years showed little change in perceptual and personality tests. Second, Witkin and his colleagues were unsuccessful in their attempts to alter mode of field approach through

experimental means such as the administration of drugs, the creation of stressful situations, and the utilization of special training. After surveying the studies which had been done up to that time, the authors concluded that "the mode of field approach is, on the whole, resistant to change by experimental means, and thus appears to be a stable characteristic of the person" (Witkin et al., 1962, p. 373).

The next year, Elliott and McMichael (1963) put two groups of relatively field-dependent persons through training procedures specifically designed to improve their performance on the RFT. The first group received instructions on how to resist the influence of the tilted frame and how to use body cues. The second group received the same training plus feedback and a discussion of each judgment. The first group did not improve, and several persons got worse. The second group showed only transient improvement which was lost upon later retesting, every subject having become worse. The authors noted that the temporary improvement seemed to be unrelated to a better utilization of the body as a referent. These subjects appeared, instead, to learn the nature of their own relatively constant types of errors and correct for the tilt of the frame without reference to kinesthetic cues. The authors concluded that the disability involved in relatively poor

RFT performance is not amenable to training, thus supporting Witkin's position.

The question of the stability of perceptual style was reopened in 1965 when Wolf published an article showing that body rotation increases field-independent performance. A year later, Jacobson (1966) published a study showing that sensory deprivation also increases field-independent performance; and Hill and Feigenbaum (1966) found that threat to self-esteem lowers field-independent performance. Kristofferson (1968) significantly decreased perceptual field independence by having her subjects ingest alcohol. Klepper (1969) increased field independence by having his subjects participate in body attention procedures. In 1970, Kurie and Mordkoff reconfirmed that both somatic concentration and sensory deprivation increase perceptual field independence. Haer (1971) decreased field independence by placing subjects under a condition of sensory overload. In 1973, Perez decreased perceptual field independence by experimentally inducing a sense of failure; and Cohen et al. (1973) increased field independence by delivering a single electro-convulsive shock treatment (ECT) to the right hemisphere and decreased field independence by delivering a single ECT to the left hemisphere of neurologically normal patients being treated for depression. In 1974, Nevill published an article showing that experimentally induced dependency motivation significantly decreased perceptual field independence.

These ten studies, published in the last nine years, obviously refer only to temporary modifications; but the important point is that they show how certain circumstances might affect an individual's cognitive functioning. It is therefore conceivable to think of cognitive functions as susceptible to certain situational pressures. None of the above studies did follow-up retesting to determine the degree of transitoriness of their effects.

In Psychological Differentiation, Witkin postulated a relationship between field-independence and forms of psychopathology and defense mechanisms. He later extended these ideas in an article entitled "Psychological Differentiation and Forms of Pathology" (1965). Independent researchers also focused on this area (Sugerman & Cancro, 1964; Ihilevich & Gleser, 1971; De Koninch & Crabbé-Declève, 1971; Lewis, 1971; Koran & Maxim, 1972; Vardy & Greenstein, 1972). Dream recall as it relates to field-independence and defense mechanisms have also received significant study (Schonbar, 1965; Fisher & Breger, 1969; Montgomery & Bone, 1970; Witkin, 1970; Bone et al., 1972; Goodenough et al., 1974). Additionally, specific groups of people who suffer from diseases which have been linked psychodynamically to dependency problems have also been studied; these include asthmatics (Fishbein, 1963), diabetics (Karp et al., 1969), and an extensive literature on alcoholics (Karp et al.,

1963; Karp et al., 1965a,b; Karp & Konstadt, 1965; Burdick, 1969; Karp et al., 1970; Goldstein et al., 1970a; Jacobson et al., 1970; Chess et al., 1971; Goldstein & Shelly, 1971). The relationship between field-dependence and alcoholism was postulated as early as 1959 by Witkin et al. and by Bailey et al.

In 1964 and 1965 Witkin published two articles which examined in greater detail his ideas about the origins of cognitive style and the role of family experiences in the development of differentiation in children (Witkin, 1964a; Dyk & Witkin, 1965). Subsequently, the area of parent-child relationships in regard to perceptual and cognitive styles has been explored by others (Corah, 1965; Lynn, 1969; Scallon & Herron, 1969; Lapidus, 1970), including the effects of father absence (Barclay & Cusumano, 1967; Wohlford & Liberman, 1970). Pure developmental studies aimed at uncovering age-related parameters of field-independence have been done (Bigelow, 1971; Dreyer et al., 1971; Keogh & Ryan, 1971; Ruble & Nakamura, 1972; Fleck, 1972) as well as studies looking at such variables as the effects of twinship (Winestine, 1969) and birth order (Culver & Dunham, 1969; Kinsolving & Bone, 1971; Simon & Wilde, 1971).

Numerous studies have examined methodological issues, primarily in regard to RFT administration (Adevai & McGough,

1968; Lester, 1968; Lester, 1969; Vaught, 1969; Gross & Moore, 1970; Cross et al., 1972; Hayes & Venables, 1972; Huckabee, 1973).

Another group of studies has been done by researchers who became interested in uncovering differences in physiological functioning between field-independent and field-dependent persons; observed variables included reactivity to insulin and epinephrine, drug placebo effects, GSR, venous flow rates, and cardiac responsivity (Courter et al., 1965; Silverman et al., 1967; Halm, 1968; McGough et al., 1969; Silverman & McGough, 1969, 1971; Goldstein et al., 1970b; Dronsejko, 1972). Others became interested in differences in psychophysical measurements taken on field-independent and field-dependent persons. Topics such as pain thresholds (Sweeney & Fine, 1965; Haslam, 1972), speed judgments (Barrett & Thornton, 1969), weight comparisons (Blasi et al., 1972), and comparison of time intervals (du Preez, 1967) are typical in this research area.

The relationship of visual after-effects and visual illusions to measures of field-independence is another strand of research appearing in the literature (Immergluck, 1966a,b; Baker & Dixon, 1967; Pressey, 1967; Vaught & Hunter, 1967; Immergluck, 1968; Pressey, 1968; Cancro & Voth, 1969; Immergluck, 1970; Andersson & Ruuth, 1971; Byth & Pearn, 1972). Eye dominance (Nadien et al., 1969)

and eye movement patterns (Conklin et al., 1968; Boersma et al., 1969b; Haley, 1973; Harley et al., 1974) have also been studied in relation to perceptual style.

Witkin suggested that field independence involves the ability to overcome the effects of embedding contexts. As an alternative hypothesis, other people tested the proposition that field independence involves the ability to resist distraction (Karp, 1963; Bloomberg, 1965b; Houston, 1969). Differences between field-independent and field-dependent persons on the Stroop Color-Word Test (Bloomberg, 1969; Hochman, 1971; Huckabee & McGown, 1971; Bone & Eysenck, 1972), on form discrimination tasks (Vaught & Ellinger, 1966; Vaught & Augustson, 1967), on anagram tasks (Bloomberg, 1965a; Boersma et al., 1969a), on perspective reversal tasks (Haronian & Sugerman, 1966) and on memory for incidental material (Fitzgibbons et al., 1965; Eagle et al., 1966; Eagle et al., 1969; Fitzgibbons & Goldberger, 1971) have also been studied.

It would be impossible to review all of the research generated by Psychological Differentiation. The above account is only representative of some of the major radii which have led from the core established by Witkin; and it is, by no means, inclusive in any respect. Hopefully, however, the reader can gain from it some appreciation for the scope of interest that was stimulated by Witkin and his ideas.

Witkin's constructs provide a convenient conceptual framework for people working in diverse areas of psychological research. Although Witkin has been criticized for empire-building, the responsibility must be shared equally by the hundreds of independent workers who have carried Witkin's hypotheses into new channels. It is fair to say that Witkin made many speculative leaps in going from his data to his theory. But in the twelve years since Psychological Differentiation was published, the task of finding empirical support for these "leaps" has begun. While the evidence is sometimes conflicting and contradictory, the bulk of it remains promising; and, as a result, Witkin's constructs remain viable. They continuously generate new research which spreads into fields far removed from those originally studied.

Because the present study deals with the relationship of sex differences and self-esteem to perceptual style, a short discussion of these areas follows.

Sex Differences in Perception

An early and consistent finding which emerged from Witkin's work (1949d) is that males are more field independent, more articulated in their approach to certain perceptual tasks, than females. Sex differences have been demonstrated down to the kindergarten level. At younger ages the problem has not yet been adequately investigated

because of methodological difficulties. There is also evidence suggesting an absence of sex differences in geriatric groups.

Speculating on the origin of these consistent sex differences, Witkin has suggested two possibilities. One possibility is that the difference between men and women in biological role and anatomic make-up leads to differences in development of articulation of experience. The fact that women's sex organs are "hidden" may make it more difficult for them to develop a clear conception of the body. This, in turn, may affect the further development of articulation of experience. Such a constitutional point of view has not received much attention although growing interest in brain-behavior relationships has led to some recent inquiry into perceptual style as it relates to brain function (Knott et al., 1973; Van Veen et al., 1973; Buchsbaum et al., 1974; Case & Globerson, 1974; Tutone, 1974). Some of these studies have dealt directly with sex differences; others have avoided the issue by choosing subjects of the same sex. In time, however, most studies in this newly developing area will invariably be forced to consider the sex differential, a circumstance which should be extremely valuable in further delineating the origins of cognitive and perceptual style.

Far more attention has been devoted to Witkin's second suggested possibility--that the basis for the observed sex

differences lies in the encouragement of a more dependent role for women in our culture, i.e., in socialization procedures. It has been shown that field-independent boys and field-dependent girls enjoy greater popularity and status among their peers than field-dependent boys and field-independent girls (Tuddenham, 1951, 1952; Iscoe & Carden, 1961; Dreyer et al., 1973).

The hypothesized role of cultural values in perceptual style has led to an interesting series of cross-cultural investigations. Witkin (1967) reviewed studies undertaken in the U.S. (examining groups from various educational and socioeconomic backgrounds), in four European countries, in Israel, and in Hong Kong. These studies consistently reaffirmed the sex distinction. Berry (1966) and MacArthur (1967) predicted there would be no sex differences in studies of Eskimo groups because Eskimo women are not socialized to be dependent. Their data was supportive of the hypothesis. Pande (1970) confirmed the traditional sex distinction in India as would be expected because of women's highly submissive role in that country. A number of researchers turned to Africa where tribes could be found with sex-role socialization procedures markedly different from those found in the U.S. and in Western Europe. The results of these studies were also supportive of Witkin's socialization hypothesis; reversals in the traditional sex distinction were found in those tribes where women are brought up

to play a more analytic and independent role than men (Dawson, 1967; Wober, 1967; Siann, 1972).

Within our culture, there is no doubt that the observed sex differences are clear-cut and pervasive; nevertheless, as Witkin has noted, they are relatively slight compared to the range of individual differences within each sex. In other words, some females appear to be as field independent as many males in their approach to the RFT and EFT.

The consistency of this observation lends additional support to the feasibility of viewing sex differences in perceptual style as reflecting something other than a biological tendency to respond in a certain manner. This within sex variance may well be a function of those personality variables subsumed under the concept of sex-role identification. In this frame of reference, an individual with a more masculine role identity would appear more field independent than an individual whose role identity was less masculine, regardless of biological sex.

Certain personality variables have been found which relate to a reversal of the traditional sex role responses. Perez (1973) found that women with high self-esteem do not follow the general feminine tendency towards field dependence. Iscoe and Carden (1961) found that high anxiety was related to field independence in girls but to field dependence in boys. Silverman et al. (1973)

reconfirmed this relationship between anxiety and perceptual style for adults and also found that high neuroticism was related to field independence in females and field dependence in males. The authors concluded that maladjusted individuals give responses on perceptual differentiation tasks which resemble those of the opposite sex. Vaught (1965) found ego strength to have a differential effect on perceptual style depending on sex. For males, it was found that as ego strength increased, so did field-independent performance. For women, however, the effect of ego strength differed in terms of the woman's role identification. For low-feminine women, as for men, there was a positive relationship between ego strength and field independence. For high-feminine women, however, there was a negative relationship; as ego strength increased, so did field-dependent performance. From the above studies, there is evidence to suggest that individuals whose emotional make-up deviates from that typical of their own sex give responses on perceptual differentiation tasks that are prototypic of the opposite sex.

Self-Esteem and Perceptual Style

Witkin has consistently reported that field-independent persons have high self-esteem while field-dependent persons have low self-esteem. A careful review of his work, however, fails to uncover any specific studies designed to

investigate this hypothesis; rather, Witkin reaches this conclusion from observation and by inference from tests of other types of behavioral indices.

The idea that self-esteem and field independence are related, however, is a theoretically logical assumption. Stanley Coopersmith, in his book The Antecedents of Self-Esteem (1967), describes his findings on the background, the personal characteristics, and the parental treatment associated with children who show high and low self-esteem. There is a strong correspondence between the variables which Coopersmith identifies as leading to high self-esteem and the variables which Witkin identifies as leading to field-independence.

A number of studies designed to search for parameters of self-esteem have converged in their conclusion that people of high and low self-esteem differ in their responsiveness to outside influence: the low self-esteem subjects being more vulnerable to external pressures and more dependent on situations (Janis, 1954; Solley & Stagner, 1956; Stotland et al., 1957; Gerard, 1961; Cohen, 1966). The parallel between this description of people low in self-esteem and the description of field-dependent persons is striking.

Only one study has purposefully looked at self-esteem in relation to perceptual style. Perez (1973) found that

high self-esteem subjects worked faster on the second administration of the EFT after an experience of failure, showing a decrease in solution time in relation to the first performance of the test. After the experience of failure, low self-esteem subjects worked slower on the second administration of the EFT and showed an increase in solution time in relation to the first performance of the test. Self-esteem, therefore, was found to interact with the experience of failure in the determination of performance on the EFT.

For purposes of the present study, the variables of self-esteem, perceptual style, and sex role identity are of central importance. Most psychologists regard self-esteem as a major, pervasive component in the individual's psychological organization. The self-evaluative attitudes encompassed by the term self-esteem affect not only the individual's personal judgment of worthiness but his relationship with other people and his manner of meeting and dealing with the environmental demands of life. As such, self-esteem is a very important and broad aspect of the individual's psychological make-up.

The perceptual process tapped by Witkin's orientation tests (the Rod-and-Frame, Tilting Room-Tilting Chair, and Rotating Room tests) has several features that make it particularly useful for the study of personal determinants of perception, one of which may be self-esteem.

To the extent that the Embedded Figures Test measures the same perceptual process, the following points can be said to apply, at least at some level, to research using the EFT as the criterion of field dependence-independence.

First, adequate orientation in space is of great and continuous importance to the person. Disorientation can lead to dizziness, confusion, and actual physical illness. This importance insures the person's deep involvement in situations that feature it and make it very likely that his performance will be influenced by general aspects of his psychological make-up. Second, because the process of orientation involves the body, the perceptual process that depends upon it is more apt to involve important personal characteristics of the individual than a perceptual process which relates mainly to neutral objects in the environment. In this regard, it has been noted that peculiarities of body structure or a poor body image often represent the starting point of low self-esteem. Third, the perceptual process in Witkin's orientation tests is a broad function depending on the effective integration of a variety of sensory experiences: visual, kinesthetic, cutaneous, visceral, and labyrinthine. This integration represents a higher-level activity; a perceptual process in which it is involved is more likely to be related to other general psychological characteristics which also

depend upon higher-level activities than is a process that is mainly determined by specific sensory effects occurring within a single sense modality.

Because self-esteem and perceptual style both involve widespread and overlapping areas of psychological functioning, it is reasonable to presume that they are related traits and that it is possible to search out the nature and parameters of their relationship. Self-esteem may, in part, depend upon success in accepting prevalent social norms including sex role prescriptions. The fact that significant sex differences, possibly evolving from socialization procedures, are an integral part of the field dependence-independence dimension points to one specific area where the determinants of self-esteem and perceptual style may converge.

The Current Study

The goal of the present study was to examine the relationship between sex role identification, self-esteem, and perceptual style while controlling for differences in intellectual ability. The control for I.Q. was essential in order to delineate whether any obtained personality differences were merely concomitants of varying intellectual capacities or whether they were significant dimensions in themselves unrelated to I.Q. More specifically, the present study sought to investigate the relationship of

role identification and self-esteem to sex differences in Embedded Figures Test performance using I.Q. as a covariate. The following hypotheses were tested: (1) those subjects whose role identification is highly masculine (low femininity) will be more field independent in the EFT than those subjects whose role identification is highly feminine, regardless of biological sex, (2) those subjects with high self-esteem will be more field independent in the EFT than those subjects with low self-esteem, regardless of biological sex, (3) self-esteem will act to reinforce the subject's preferred mode of responding, which will be congruent with his or her role identity. In addition, it was specified that attention be focused on whatever role I.Q. was found to play in determining the results because of the hypothesis made by some theorists that the Embedded Figures Test is merely a nonverbal measure of intelligence.

METHOD

Subjects

Fifty males and fifty females enrolled in introductory psychology classes at the University of Florida during the spring, 1975, quarter participated in the study.

Materials

The Group Embedded Figures Test (GEFT, Witkin et al., 1971) was used as the measure of field-dependence-independence. The standard test makes use of a series of 18 complex figures, in each of which a simple figure is to be located. The subject's score is the number correct attained within a specified time limit.

The Femininity Scale (Fy Scale) from the Personal Values Abstract (Gough, 1972; a derivative of the California Psychological Inventory) was used as a measure of role identification. The Fy Scale is composed of thirty-four self-description items which are answered as either "true" or "false." The scale has been validated and cross-validated on college and high school students.

The Tennessee Self Concept Scale (TSCS) was used as a measure of self-esteem. The TSCS is composed of 100 self-description items. For each item, the subject chooses

one of five responses labeled from "completely false" to "completely true." Eight self-esteem scores are derived (identity, self-satisfaction, behavior, physical self, moral-ethical self, personal self, family self, social self) from which a Total Positive Score, reflecting the overall level of self-esteem, is computed.

In order to control for intelligence, Scale 3, Form A, of the Culture Fair Intelligence Test (Cattell, 1959) was also administered. This test is nonverbal and requires that examinees be able to perceive relationships in shapes and figures. Scale 3 is specially designed to discriminate among higher ranges of intelligence from high school age on through adulthood and is especially well suited for research with college students.

Procedure

Fifty male and fifty female students, all volunteers, were scheduled for a two-hour testing session. Since each instrument could be administered in a group setting, the subjects were scheduled to be tested in groups ranging in size from ten to twenty people. The decision concerning the appropriate size for the groups was based upon the space available and was made prior to beginning the experiment.

Upon entering the testing room, each subject was asked to fill out the Tennessee Self Concept Scale. The

title of the questionnaire had been blacked out in order to prevent subjects from identifying it as a scale of self-esteem. Self-esteem was measured first in order to prevent the effect of poor achievement on the performance tests from spuriously lowering the score. After all subjects had handed in their completed questionnaire, the examiner first administered Scale 3, Form A, of the Culture Fair Intelligence Test and then administered the Group Embedded Figures Test. Standard group administration procedures for both tests were strictly followed. Finally, the subjects were asked to complete the Personal Values Abstract. Standard scoring procedures for the four instruments were carefully followed.

RESULTS

The data (four scores for each subject--I.Q., GEFT, PVA, and TSCS) were analyzed using a multiple regression model. In order to take biological sex into consideration, a dummy variable for sex was introduced. I.Q. was used as a covariate. Standard multiple regression and analysis of covariance procedures were followed. Computations were done on the Northeast Regional Data Center's IBM 370 Model 165 computer using computer program SAS (Barr & Goodnight, 1972).

Sex Differences and GEFT

The mean score on the GEFT was 12.94 for males and 10.90 for females. These scores correspond highly with those published by Witkin for college students on GEFT performance (12.0 and 10.8 for males and females respectively). Controlling for I.Q., men were found to have significantly higher GEFT scores than women ($p = .0173$, 2-sided test), indicating that the males in the sample were significantly more field independent relative to the females in the sample.

I.Q. and GEFT

In order to determine how I.Q. relates to performance on the GEFT, a linear regression analysis was done first for all subjects (men and women combined) and then separately for men and for women. For all subjects, the best predictor of GEFT as a linear function of I.Q. is: GEFT = -8.82 + .18 I.Q. + error. This relationship is positive and significant at the .0001 level. Figure 1 graphically illustrates I.Q. as a predictor of GEFT.

An F test for comparison of two models was used to test the null hypothesis that the relationship of I.Q. to GEFT performance is the same for men as for women. There is no evidence that the relationship between I.Q. and GEFT is different between the sexes ($F = .91$; $df = 96$; $p = .66$).

A simple correlation of .48 ($p = .001$) was found between I.Q. and GEFT for all subjects, indicating that I.Q. accounts for almost 25 percent of the variance in GEFT performance.

Femininity and GEFT

In order to determine how degree of femininity (PVA) relates to GEFT performance, an analysis of covariance was run, controlling for I.Q. and for different average GEFT scores for men and women. This requires the same slope for males and females on the variable PVA. For males, the

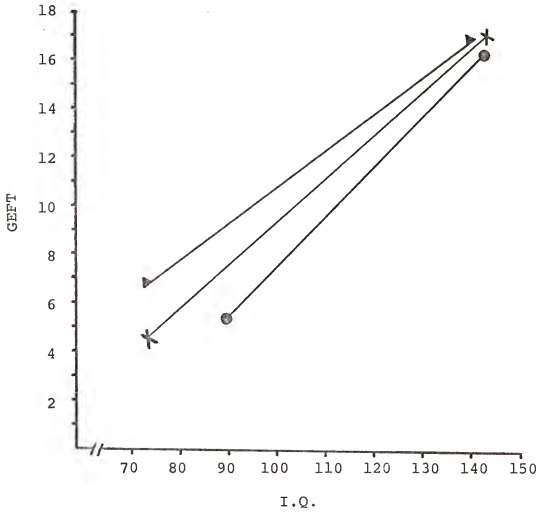

Figure 1 I.Q. as a Predictor of GEFT

▲ Males Only

✕ Males and Females Combined

● Females Only

best predictor of GEFT as a linear function of I.Q. and PVA is: GEFT = -1.60 + .18 I.Q. - .33 PVA + error; for females, the best predictor of GEFT as a linear function of I.Q. and PVA is: GEFT = -3.64 + .18 I.Q. -.33 PVA + error. The negative relationship of PVA to GEFT is statistically significant at the .0186 level. Figure 2 graphically illustrates this relationship.

To determine if the relationship of PVA to GEFT is the same for males as for females, controlling for I.Q. and for different average GEFT scores for men and women, a regression analysis of GEFT on I.Q. and PVA was run separately for males and for females. This allows for a different slope for the variable PVA for males and females. The variable PVA has a significant negative relationship to GEFT for males ($p = .0144$) while the variable PVA is not significantly related to GEFT for females ($p = .5052$). Figure 3 graphically illustrates these relationships.

An F test for comparison of two models was used to test the null hypothesis that the relationship of PVA to GEFT is the same for males as for females. There was no evidence that the relationship between PVA and GEFT is different for males than for females ($F = 1.19$; $df = 1, 94$; $p = .29$).

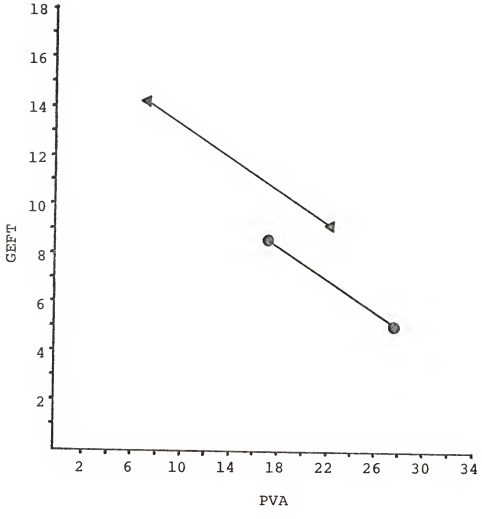

Figure 2 Femininity (PVA) as a Predictor of GEFT (I.Q. Controlled)

▲ Males

● Females

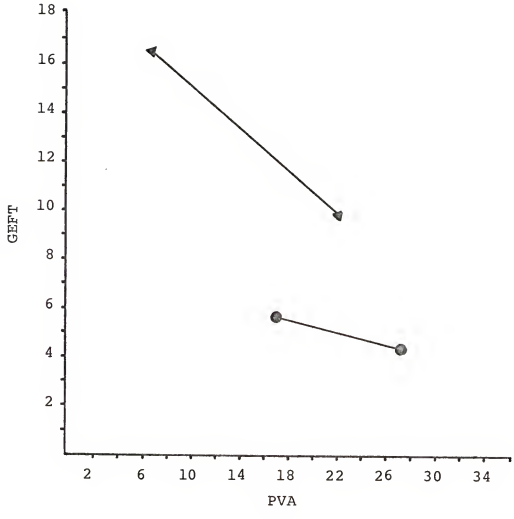

Figure 3 Femininity (PVA) as a Predictor of GEFT (I.Q. Controlled)

▲ Males

● Females

A simple correlation of -.308 ($p = .001$) was found between PVA and GEFT for all subjects, indicating that PVA accounts for 9 percent of the variance in GEFT performance.

Self-Esteem and GEFT

In order to determine how level of self-esteem relates to GEFT performance, an analysis of covariance was run controlling for I.Q. and for average GEFT sex differences. The best predictor for GEFT as a linear function of TSCS is: males: GEFT = -9.85 + .18 I.Q. + .006 TSCS + error

females: GEFT =-11.89 + .18 I.Q. + .006 TSCS + error

Self-esteem is not significantly related to GEFT performance ($p = .6519$).

The analysis of covariance was also run separately for males and females, a procedure which allows for a different slope of the regression line for men and for women. Self-esteem is not significantly related to GEFT either for males ($p = .5833$) or for females ($p = .5052$). The results show a slight trend for self-esteem to be positively related to GEFT performance for women and negatively related to GEFT performance for men. A much larger sample size would be needed to determine whether this observed change of sign is real or whether it is merely a result of sampling error.

Interaction of Femininity and Self-Esteem on GEFT

In order to determine if level of self-esteem interacts with degree of femininity to influence GEFT performance, an analysis of covariance with GEFT as the dependent variable and sex, I.Q., PVA, TSCS, and PVA X TSCS was used. In this model, interaction of PVA and TSCS is represented by the product P. This analysis was done for males and females combined and for males and females separately.

For males and females combined the best linear predictors are:

males: GEFT = 33.31 + .18 I.Q. - 2.16 PVA - .1 TSCS + .005 P + error

females: GEFT = 31.27 + .18 I.Q. - 2.16 PVA - .1 TSCS + .005 P + error

The interaction of femininity and self-esteem is not statistically significant ($p = .0802$).

For males and females in separate covariance analyses (allowing for different slopes for PVA, TSCS, and P), no significant interaction of femininity and self-esteem either for males ($p = .3730$) or for females ($p = .0590$) was found.

An F test for comparison of two models was used to test the null hypothesis that males and females have the same relationship between GEFT and PVA, TSCS, and interaction between PVA and TSCS. There is no evidence that the interaction of PVA and TSCS is different for men than for women ($F = 2.65$; $df = 3, 90$; $p > .05$).

Table 1 summarizes the regression equations and the corresponding variance calculations.

Table 1

Multiple Regression Equations for Predicting GEFT as a Function of I.Q., Sex, PVA, TSCS, and PVA X TSCS (P) Interaction

Independent Variables	Regression Equations	R^2
I.Q.	GEFT = -8.82 + .18 I.Q. + error	.2304
I.Q., Sex	GEFT = -4.48 + .15 I.Q. + error (males) GEFT = -13.70 + .21 I.Q. + error (females)	
I.Q., TSCS	GEFT = -9.85 + .18 I.Q. + .006 TSCS + error (males) GEFT = -11.89 + .18 I.Q. + .006 TSCS + error (females)	.2759
I.Q., TSCS, Sex	GEFT = -1.05 + .15 I.Q. - .01 TSCS + error (males) GEFT = -22.93 + .22 I.Q. + .02 TSCS + error (females)	
I.Q., PVA	GEFT = -1.60 + .18 I.Q. - .33 PVA + error (males) GEFT = -3.64 + .18 I.Q. - .33 PVA + error (females)	.3188
I.Q., PVA, Sex	GEFT = 1.56 + .16 I.Q. - .45 PVA + error (males) GEFT = -9.93 + .21 I.Q. - .14 PVA + error (females)	
I.Q., PVA, TSCS, P	GEFT = 33.31 + .18 I.Q. - 2.16 PVA - .1 TSCS + .005 P + error (males) GEFT = 31.27 + .18 I.Q. - 2.16 PVA - .1 TSCS + .005 P + error (females)	.3407
I.Q., PVA, TSCS, P, Sex	GEFT = -9.60 + .16 I.Q. + .98 PVA + .04 TSCS - .005 P + error (males) GEFT = 66.33 + .22 I.Q. - 4.10 PVA + .23 TSCS + .011 P + error (females)	

DISCUSSION

The results of this study support the first hypothesis that those subjects whose role identification is more masculine are more field independent in the EFT than those subjects whose role identification is more feminine, regardless of biological sex. The fact that sex role identification in the present study is related to field-dependence-independence in a manner that cuts across biological sex strongly suggests that the basis for the observed sexual differences in perceptual style lies in socialization procedures and not in biological factors. That men are consistently more field-independent in western cultures implies that the majority of men subscribe to the traditional sex roles with their corresponding value systems.

The results of the present study do not support the second or third hypotheses; namely, that those subjects with high self-esteem are more field independent in the EFT than those subjects with low self-esteem, regardless of biological sex, and that self-esteem acts to reinforce the subject's preferred mode of responding, which is congruent with his or her role identity. The lack of any significant relationship between self-esteem and perceptual

style and the slight trend for low self-esteem to be related to greater accuracy in embedded figures performance for males is inconsistent with the existing body of theoretical literature. This study is, however, the first experimental investigation undertaken to determine precisely the nature of the relationship between these two variables, and the results are valuable as such. Much can be done in the future in this area of inquiry. Different measures of self-esteem should be employed as well as looking at various subcategories of self-esteem (physical self, moral-ethical self, social self, etc.) in relation to perceptual style.

The results of this study lend themselves to a re-examination of the Witkin-Zigler controversy concerning the role intelligence plays in perceptual style. Witkin has reported correlations ranging up to .76 between scores on his perceptual tests and scores on the Wechsler Intelligence Scale for Children (WISC). For this reason, Witkin undertook a factor analysis to discover if the relationship between the perceptual tests and intelligence was carried by specific subtests of the WISC. Three oblique factors were derived. The first factor was principally defined by verbal scales on the WISC (vocabulary, information, similarities); Witkin's perceptual tests had positive but nonsignificant loadings on this factor. The third factor was principally defined by high positive

loadings of Witkin's perceptual tests and the WISC picture completion, block design, and object assembly scales. Witkin considers this factor to be a measure of differentiation, and he argues that the three WISC scales which load on this factor are, in part, measures of differentiation.

As noted earlier in the introduction to this study, Witkin's views on the relationship between intelligence and differentiation are as follows:

1. Indices of differentiation, such as the Embedded Figures Test, are not measures of intelligence. In particular, these indices are not related to verbal measures of intelligence.

2. Some nonverbal measures of intelligence are, in part, measures of differentiation.

3. The concept of differentiation is more highly evolved theoretically than is the concept of intelligence as it is used in standardized I.Q. tests. Therefore, to replace the concept of differentiation with one of intelligence is to resort to a less comprehensive framework.

Zigler does not accept these three premises. He is certain that differences in intelligence mediate the relationship between Witkin's perceptual tests and other variables. First, he holds that it is incorrect to assert that verbal measures of ability are unrelated to Witkin's perceptual tests. In almost every study, there is a

positive correlation between verbal and nonverbal measures of intelligence. Zigler points out that in Witkin's factor analysis of the WISC, the verbal comprehension factor (Factor I) correlated .34 with the factor interpreted as a measure of differentiation (Factor III).

The consistency in positive correlations found among various measures of intellectual ability forms the empirical basis for the theory that all measures of intelligence reflect to a greater or lesser degree one fundamental ability called g (Spearman, 1927). Cattell (Horn & Cattell, 1966), developing the theory further, has suggested that g has two discernible but related components called crystallized and fluid intelligence. Crystallized intelligence represents the effects of tuition and learning while fluid intelligence represents an innate and relatively fixed neural-physiological capacity. It is assumed that tests of intelligence measure, in varying degrees, both components. The WISC scales which defined verbal ability (Factor I) in Witkin's factor analysis--vocabulary, information, similarities--are assumed to be predominantly measures of crystallized intelligence, or that form of intelligence heavily influenced by cultural and academic experience. The WISC scales which were related to Witkin's perceptual tests (Factor III)--picture completion, block design, object assembly--are assumed to be predominantly measures of fluid intelligence, or that

form of intelligence which is innate and neurophysiological in nature. It is Zigler's argument that all of Witkin's perceptual tests including the Embedded Figures Test are primarily indices of nonverbal fluid intelligence because of their similarities to the above-listed performance subtests of the WISC.

If intelligence is the critical variable accounting for the relationship between Witkin's perceptual tasks and other variables, then, according to Zigler, the statistical control for differences in intelligence should reduce or remove these relationships. The argument that intelligence is the central mediating concept in Witkin's research would no longer be viable if research supporting the differentiation theory is done which controls for I.Q. and uses objective measures. In particular, Zigler questions the validity of the long-found sex differences in Witkin's perceptual investigations where males score significantly higher than females. Since, according to Zigler, it is well known that males are superior in nonverbal measures of intelligence to females, the sex differences in Witkin's indices of differentiation are compatible with the view that the perceptual tests are, in fact, measures of nonverbal intelligence.

The Culture Fair Intelligence Test used in this study was designed by Cattell primarily as a measure of nonverbal fluid intelligence. As such, it offered a unique

opportunity to test Zigler's hypothesis that such a control would reduce or remove the sex differential found previously. The results clearly showed that the control for I.Q. did not remove or diminish the traditional sex differences. The mean scores on the Culture Fair for males and females were almost identical with the females' mean score slightly higher (115.22; 115.58) while the males' mean score on the GEFT was significantly higher than the females. Also, the control for I.Q. had no diminishing effect on the role that sex identification plays in GEFT performance. A more feminine sex-role identity leads to poorer performance and a more masculine sex-role identity leads to better performance, regardless of biological sex. It is apparent here that although there is a strong positive significant relationship between I.Q. and the GEFT, it cannot be said that Witkin's test is merely a measure of nonverbal intelligence. It appears more reasonable to say, as Witkin claims, that some nonverbal measures of intelligence are, in part, measures of differentiation.

This study is significant in its reconfirmation of the sex differential found in perception, in its clarification of the part played by sex-role identification in this differential, and in its disconfirmation of the notion that I.Q. accounts for those differences. The latter point is crucially important at the present time. The

Witkin-Zigler controversy over the role which intelligence factors play in perceptual style is the current focus of conflict after thirty years of research into field-dependence-independence. To a very great extent, the fate of Witkin's constructs depend on the resolution of this conflict. The present study adds a tally to Witkin's camp.

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BIOGRAPHICAL SKETCH

Sherril Maigne Hulfish was born February 12, 1944, in Alexandria, Virginia. She was graduated from George Washington High School in Alexandria in June, 1962. For the next six and a half years she worked in the Washington, D.C., area, holding positions at the National Gallery of Art, the Smithsonian Institution, and the National Institutes of Health.

In January, 1969, Miss Hulfish entered the University of Maryland where she received the Bachelor of Arts degree with high honors in June, 1972, and was elected to membership in Phi Beta Kappa and Phi Kappa Phi.

Miss Hulfish enrolled in the graduate program in clinical psychology at the University of Florida in September, 1972, where she received the Master of Arts degree in June, 1974. She served an internship in clinical psychology at Saint Elizabeth's Hospital in Washington, D.C., from September, 1975, to September, 1976.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Nathan W. Perry, Jr., Chairman
Professor of Psychology

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Hugh C. Davis, Jr.
Professor of Psychology

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Vernon Van De Riet
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